MODELLING BID PRICE FOR CONCESSION SCHEMES UNDER UNCERTAINTY: AN OPTIMIZATION APPROACH

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ABSTRACT

Bid price is one of the decisive factors in evaluation and awarding of concession schemes through competitive tendering. In conjunction with concession length and equity level, bid price defines promoters' profitability and competitiveness. Promoters, therefore, need to balance their own investment interest with that of the sponsors considering the abovementioned elements, which is even more challenging, since uncertainties are inherent in investment to concession schemes.

This paper presents a novel optimization model to reveal a competitive bid price along with concession length and equity level, for maximization of promoters' bid-winning potential within uncertain concession investment opportunity, at the tendering stage. Fuzzy set theory and genetic algorithm are combined, and utilized as the building blocks for model development. Within the process of genetic algorithm-based optimization, uncertainties leading to imprecise estimation of investment parameters are accounted through fuzzy set theory. The model results enable promoter to offer a profitable, yet competitive financial proposal to sponsor. A real world concession scheme is used to demonstrate application of the proposed model.

Keywords: Bid, Concession scheme, Fuzzy sets, Genetic algorithm, Optimization

INTRODUCTION

Competitive tendering is widely used in awarding concession schemes by governments or their subsidiary organizations (sponsors) to private entities (promoters). With the aspiration of winning a concession contract, prospective promoters submit tender proposals along with financial offers to sponsors. Among the pool of competitors, sponsors grant a concession scheme to a promoter, after critical evaluation of submitted financial offers. This is because each financial offer contains key elements, including promoters' profitability and sponsors' financial return, which must be agreeable to sponsors. Promoters, therefore, need to play a two-way role in designing a financial offer: augment their own profitability, and propound financial offer containing bid price, as attractive as possible to sponsors.

Bid price, is one of the important investment elements, which largely plays a catalytic role in giving rise to conflicts between promoters and sponsors. It closely appraises promoters' profitability; at the same time, it also represents end-users' ability to afford